

Application No. 10/085,406
Amendment dated March 9, 2004
Reply to Office Action of February 13, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (original) A guard for use in human spinal surgery across a disc space between two adjacent vertebral bodies, comprising:
 - a body having a leading end and opposite a trailing end, said body having a first portion and a second portion in pivotal relationship to one another proximate said leading end between an open position and a closed position, said first and second portions having at least in part opposed interior arcuate portions, respectively, said first and second portions defining an opening for providing protected access to the disc space and the adjacent vertebral bodies, said opposed interior arcuate portions being adapted to guide therethrough a drill sized to form an implantation space across the disc space and at least in part into the adjacent vertebral bodies; and
 - at least one disc space penetrating extension extending from said leading end of said body adapted for insertion at least in part into the disc space, said extension having a first portion extending from said first portion of said body, said first portion of said extension having a contact surface adapted to bear against one of the adjacent endplates of the adjacent vertebral bodies, said extension having a second portion extending from said second portion of said body, said second portion of said extension having a contact surface adapted to bear against the other of the adjacent endplates of the adjacent vertebral bodies, said contact surfaces of said first and second portions being in pivotal relationship to one another from an insertion position to a deployed position to move the adjacent vertebral bodies apart upon movement of said first and second portions of said body from the open position to the closed position.

Application No. 10/085,406
Amendment dated March 9, 2004
Reply to Office Action of February 13, 2004

2. (original) The guard of claim 1, wherein said opposed interior arcuate portions of said first and second portions of said body are parallel to one another when said body is in the closed position.
3. (original) The guard of claim 1, wherein said opposed interior arcuate portions of said first and second portions of said body are angled to one another when said body is in the open position.
4. (original) The guard of claim 1, wherein said opening defined by said first and second portions of said body is generally circular when said body is in the closed position.
5. (original) The guard of claim 1, wherein said opening defined by said first and second portions of said body is generally oval.
6. (original) The guard of claim 1, wherein said opening defined by said first and second portions of said body is generally elliptical.
7. (original) The guard of claim 1, wherein said body has an exterior surface that has opposed upper and lower surfaces oriented toward the adjacent vertebral bodies, respectively, said upper and lower surfaces being at least in part arcuate.
8. (original) The guard of claim 7, wherein at least a portion of said upper and lower surfaces of said exterior surface are parallel to one another when said body is in the closed position.
9. (original) The guard of claim 7, wherein at least a portion of said upper and lower surfaces of said exterior surface are angled to one another when said body is in the open position.
10. (original) The guard of claim 7, wherein said exterior surface of said body has opposed side surfaces, said side surfaces being at least in part arcuate.
11. (original) The guard of claim 10, wherein said side surfaces of said exterior surface are parallel to one another.
12. (original) The guard of claim 1, wherein said body has an exterior surface that has a generally circular cross section along at least a portion of the length of said body.

Application No. 10/085,406
Amendment dated March 9, 2004
Reply to Office Action of February 13, 2004

13. (original) The guard of claim 1, wherein said body has an exterior surface that has a generally oval cross section along at least a portion of the length of said body.
14. (original) The guard of claim 1, wherein said body has an exterior surface that has a generally elliptical cross section along at least a portion of the length of said body.
15. (original) The guard of claim 1, wherein said body has a generally circular cross section along at least a portion of the length of the guard.
16. (original) The guard of claim 1, wherein said body has a generally oval cross section along at least a portion of the length of the guard.
17. (original) The guard of claim 1, wherein said body has a generally elliptical cross section along at least a portion of the length of the guard.
18. (original) The guard of claim 1, wherein said first and second portions of said body cooperatively engage along the length of the body when in the closed position.
19. (original) The guard of claim 1, wherein said first and second portions of said body when in the closed position form a tube.
20. (original) The guard of claim 1, wherein said leading end of said body is adapted to conform at least in part to the exterior surface of the adjacent vertebral bodies.
21. (original) The guard of claim 1, wherein said leading end of said body has a cutback to permit the curvature of the two adjacent vertebral bodies to have an intimate fit between said body and the two adjacent vertebral bodies when said contact surfaces are in the deployed position.
22. (original) The guard of claim 1, wherein said first and second portions of said extension touch one another when in the insertion position.
23. (original) The guard of claim 1, wherein said extension has a height between said contact surfaces and a length sufficient to properly align and distance apart the adjacent vertebral bodies when in the deployed position.
24. (original) The guard of claim 23, wherein said contact surfaces have a length

Application No. 10/085,406
Amendment dated March 9, 2004
Reply to Office Action of February 13, 2004

- greater than one half the depth of the disc space measured from the anterior to posterior aspect of the adjacent vertebral bodies.
25. (original) The guard of claim 1, wherein said contact surfaces are parallel to each other along a substantial portion of the length thereof when in the insertion position.
 26. (original) The guard of claim 1, wherein said body has an external surface at its leading end and said extension has an external surface that is at least in part coextensive with said external surface of said body.
 27. (original) The guard of claim 1, wherein said extension has a tapered leading end to facilitate placement of said extension into the disc space when in the insertion position.
 28. (original) The guard of claim 1, further comprising at least a second disc space penetrating extension extending from said leading end of said body.
 29. (original) The guard of claim 28, wherein said extensions are diametrically opposed to each other and spaced apart from one another to provide access to the adjacent vertebral bodies from within the disc space.
 30. (original) The guard of claim 29, wherein said extensions have the same height.
 31. (original) The guard of claim 29, wherein said extensions have the same height at the same distance along their length from said body.
 32. (original) The guard of claim 1, wherein said opposed contacting surfaces diverge away from said body along at least a portion of their length.
 33. (original) The guard of claim 1, wherein said body has at least one window adapted to permit portions of bone extending through said window to be removed by the drill passing through said body.
 34. (original) The guard of claim 1, wherein said body has at least one window adapted to permit the surgeon to observe the surgery through said window.
 35. (original) The guard of claim 1, wherein said first and second portions of said body are hinged to one another to rotatably articulate relative to one another.

Application No. 10/085,406
Amendment dated March 9, 2004
Reply to Office Action of February 13, 2004

36. (original) The guard of claim 1, wherein said first and second portions of said body rotatably articulate relative to one another about an axis of rotation that is fixed relative to the mid-longitudinal axis of said guard when moved from the insertion position to the deployed position.
37. (original) The guard of claim 1, further comprising an impaction cap adapted to cooperatively engage said trailing end of said body when said body is in the open position.
38. (original) The guard of claim 1, further comprising a lock adapted to cooperatively engage said body of said guard when said body is in the closed position to hold said body in the closed position.
39. (original) The guard of claim 38, wherein said lock is a collar adapted to cooperatively engage said body of said guard when said body is in the closed position to hold said body in the closed position.
40. (original) The guard of claim 38, wherein said collar threadably engages said trailing end of said body of said guard.
41. (original) The guard of claim 1, wherein said body has a height in the range of 8-25 mm.
42. (original) The guard of claim 1, wherein said opening defined by said first and second portions of said body has a height in the range of 8-20 mm.
43. (original) The guard of claim 1, wherein said extension has a combined height when closed in the range of 6-18 mm.
44. (original) The guard of claim 1, wherein said extension has a length in the range of 12-32 mm.
45. (original) The guard of claim 1, in combination with a bone removal device for forming through said guard an implantation space across the disc space.
46. (currently amended) The guard of claim 45, wherein said bone removal device is selected from the group consisting of a drill, a trephine, a reamer, an end mill, a chisel, and a burr.

Application No. 10/085,406
Amendment dated March 9, 2004
Reply to Office Action of February 13, 2004

47. (original) The guard of claim 45, wherein said bone removal device has a height in the range of 8-20 mm.
48. (original) The guard of claim 1, in combination with an implant driver sized in part for passage through said opening for passing an implant through said guard and into the disc space.
49. (original) The guard of claim 52, wherein said implant driver comprises a shaft adapted to engage the implant at one end and a handle for manipulating said implant driver at the other end of said shaft.
50. (original) The guard of claim 1, in combination with a spinal implant adapted to be inserted in the implantation space formed through said guard.
51. (original) The guard of claim 1, in combination with an implant sized and shaped to at least in part match the space formed in the spine by the bone removal device.
52. (original) The guard of claim 50, wherein said implant comprises at least one of bone and bone growth promoting material.
53. (original) The guard of claim 52, wherein said bone growth promoting material is selected from one of bone, bone derived products, demineralized bone matrix, ossifying proteins, bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.
54. (original) The guard of claim 50, wherein said implant is in combination with a bone growth promoting material.
55. (currently amended) The guard of claim 54, wherein said bone growth promoting material is selected from one of bone, bone derived products, demineralized bone matrix, ossifying proteins, bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.
56. (original) The guard of claim 50, wherein said implant is treated with a bone growth promoting substance.

Application No. 10/085,406
Amendment dated March 9, 2004
Reply to Office Action of February 13, 2004

57. (original) The guard of claim 50, wherein said implant comprises at least one of the following materials: metal, titanium, plastic, and ceramic appropriate for implantation in the human body.
58. (original) The guard of claim 50, wherein said implant is at least in part resorbable.
59. (original) The guard of claim 50, wherein said implant is formed of a porous material.
60. (original) The guard of claim 50, in combination with a chemical substance adapted to inhibit scar formation.
61. (original) The guard of claim 50, in combination with an antimicrobial material.
62. (original) A guard for use in human spinal surgery across a disc space between two adjacent vertebral bodies, comprising:
 - a body having an opening for providing protected access to the disc space and the adjacent vertebral bodies, said opening having at least in part opposed interior arcuate portions adapted to guide therethrough a drill sized to form an implantation space across the disc space and at least in part into the adjacent vertebral bodies; and
 - at least one disc space penetrating extension extending from said body adapted for insertion at least in part into the disc space, said disc penetrating extension having a first portion having a contact surface adapted to bear against one of the adjacent endplates of the adjacent vertebral bodies and a second portion having a contact surface adapted to bear against the other of the adjacent endplates of the adjacent vertebral bodies, said contact surfaces of said first and second portions being rotatably articulating relative to one another between an insertion position and a deployed position to move the adjacent vertebral bodies apart.
63. (original) The guard of claim 62, wherein said opposed interior portions of said body are parallel to one another.

Application No. 10/085,406
Amendment dated March 9, 2004
Reply to Office Action of February 13, 2004

64. (original) The guard of claim 62, wherein said opposed interior portions of said body are angled to one another.
65. (original) The guard of claim 62, wherein said opening is generally circular.
66. (original) The guard of claim 62, wherein said opening is generally oval.
67. (original) The guard of claim 62, wherein said opening is generally elliptical.
68. (original) The guard of claim 62, wherein said body has an exterior surface that has opposed upper and lower surfaces oriented toward the adjacent vertebral bodies, respectively, said upper and lower surfaces being at least in part arcuate.
69. (original) The guard of claim 68, wherein said body has an exterior surface that has opposed side surfaces, said side surfaces being at least in part arcuate.
70. (original) The guard of claim 69, wherein said side surfaces of said exterior surface are parallel to one another.
71. (original) The guard of claim 62, wherein said body has an exterior surface that has a generally circular cross section along at least a portion of the length of said body.
72. (original) The guard of claim 62, wherein said body has an exterior surface that has a generally oval cross section along at least a portion of the length of said body.
73. (original) The guard of claim 62, wherein said body has an exterior surface that has a generally elliptical cross section along at least a portion of the length of said body.
74. (original) The guard of claim 62, wherein said body has a generally circular cross section along at least a portion of the length of the guard.
75. (original) The guard of claim 62, wherein said body has a generally oval cross section along at least a portion of the length of the guard.
76. (original) The guard of claim 62, wherein said body has a generally elliptical cross section along at least a portion of the length of the guard.
77. (original) The guard of claim 62, wherein said body has a leading end adapted to conform at least in part to the exterior surface of the adjacent vertebral bodies.

Application No. 10/085,406
Amendment dated March 9, 2004
Reply to Office Action of February 13, 2004

78. (original) The guard of claim 62, wherein said body has a leading end that is cutback to permit the curvature of the two adjacent vertebral bodies to have an intimate fit between said body and the two adjacent vertebral bodies when said contact surfaces are in the deployed position.
79. (original) The guard of claim 62, wherein said first and second portions of said extension touch one another when in the insertion position.
80. (original) The guard of claim 62, wherein said extension has a height between said contact surfaces and a length sufficient to properly align and distance apart the adjacent vertebral bodies when in the deployed position.
81. (original) The guard of claim 80, wherein said contact surfaces have a length greater than one half the depth of the disc space measured from the anterior to posterior aspect of the adjacent vertebral bodies.
82. (original) The guard of claim 62, wherein said contact surfaces are parallel to each other along a substantial portion of the length thereof when in the insertion position.
83. (original) The guard of claim 62, wherein said body has an external surface and said extension has an external surface that is at least in part coextensive with said external surface of said body.
84. (original) The guard of claim 62, wherein said extension has a tapered leading end to facilitate placement of said extension into the disc space when in the insertion position.
85. (original) The guard of claim 62, further comprising at least a second disc space penetrating extension extending from said body.
86. (original) The guard of claim 85, wherein said extensions are diametrically opposed to each other and spaced apart from one another to provide access to the adjacent vertebral bodies from within the disc space.
87. (original) The guard of claim 86, wherein said extensions have the same height.
88. (original) The guard of claim 86, wherein said extensions have the same height at the same distance along their length from said body.

Application No. 10/085,406
Amendment dated March 9, 2004
Reply to Office Action of February 13, 2004

89. (original) The guard of claim 62, wherein said opposed contacting surfaces diverging away from said body along at least a portion of their length.
90. (original) The guard of claim 62, wherein said body has at least one window adapted to permit portions of bone extending through said window to be removed by the bone removal device passing through said body.
91. (original) The guard of claim 62, wherein said body has at least one window adapted to permit the surgeon to observe the surgery through said window.
92. (original) The guard of claim 62, wherein said first and second portions of said disc space penetrating extension are hinged to one another to rotatably articulate relative to one another.
93. (original) The guard of claim 62, wherein said first and second portions of said disc space penetrating extension rotatably articulate relative to one another about an axis of rotation that is fixed relative to the mid-longitudinal axis of said guard when moved from the insertion position to the deployed position.
94. (original) The guard of claim 62, further comprising an impaction cap adapted to cooperatively engage a trailing end of said body.
95. (original) The guard of claim 62, wherein said body has a height in the range of 8-25 mm.
96. (original) The guard of claim 62, wherein said opening of said body has height in the range of 8-20 mm.
97. (original) The guard of claim 62, wherein said extension has a combined height when closed in the range of 6-18 mm.
98. (original) The guard of claim 62, wherein said extension has a length in the range of 12-32 mm.
99. (original) The guard of claim 62, in combination with a bone removal device for forming through said guard an implantation space across the disc space.
100. (original) The guard of claim 99, wherein said bone removal device is selected from the group consisting of a drill, a trephine, a reamer, an end mill, a chisel, and a burr.

Application No. 10/085,406
Amendment dated March 9, 2004
Reply to Office Action of February 13, 2004

101. (original) The guard of claim 99, wherein said bone removal device has a height in the range of 8-20 mm.
102. (original) The guard of claim 62, in combination with an implant driver sized in part for passage through said opening for passing an implant through said guard and into the disc space.
103. (original) The guard of claim 102, wherein said implant driver comprises a shaft adapted to engage the implant at one end and a handle for manipulating said implant driver at the other end of said shaft.
104. (original) The guard of claim 62, in combination with a spinal implant adapted to be inserted in the implantation space formed through said guard.
105. (original) The guard of claim 104, in combination with an implant sized and shaped to at least in part match the space formed in the spine by the bone removal device.
106. (original) The guard of claim 104, wherein said implant comprises at least one of bone and bone growth promoting material.
107. (original) The guard of claim 106, wherein said bone growth promoting material is selected from one of bone, bone derived products, demineralized bone matrix, ossifying proteins, bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.
108. (original) The guard of claim 104, wherein said implant is in combination with a bone growth promoting material.
109. (currently amended) The guard of claim 108, wherein said bone growth promoting material is selected from one of bone, bone derived products, demineralized bone matrix, ossifying proteins, bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.
110. (original) The guard of claim 108, wherein said implant is treated with a bone growth promoting substance.

Application No. 10/085,406
Amendment dated March 9, 2004
Reply to Office Action of February 13, 2004

111. (original) The guard of claim 108, wherein said implant comprises at least one of the following materials: metal, titanium, plastic, and ceramic appropriate for implantation in the human body.
 112. (original) The guard of claim 108, wherein said implant is at least in part resorbable.
 113. (original) The guard of claim 108, wherein said implant is formed of a porous material.
 114. (original) The guard of claim 108, in combination with a chemical substance adapted to inhibit scar formation.
 115. (original) The guard of claim 108, in combination with an antimicrobial material.
- Claims 116-159 (cancelled).